No one can bring about a great reform, unless in a social medium already somewhat prepared for it. It was Rolleston's good fortune to work at a time when his efforts were not mere hopeless assaults on a fortress rendered impregnable by prejudice. He battled at an epoch when many sympathized with him, and were ready to help. But it is his glory to have been the leader, exceptionally fitted by natural gifts and academic career, to conduct to victory those who desired to widen the range of Oxford studies. To him, more than to any other one man, is it due that in biological teaching the university on the Isis is now pressing close on the heels of her sister on the Cam.

PROFESSOR MARSH ON THE DINOCERATA.

OF late years Professor Marsh has been following the plan of selecting a certain group of extinct vertebrates, and thoroughly elucidating its structure in an exhaustive monograph. Where practicable, this plan is by far the most satisfactory method of dealing with the subject; but it seldom falls to the lot of a paleontologist to obtain his materials in the necessary abundance. The volume before us is a magnificent one, surpassing in many respects all other paleontological works. Never before has such a remarkably perfect series of mammalian fossils, illustrating a single group, been brought together. Only in the tertiary lake-deposits of western America could such a collection have been formed; but few can realize what an expenditure of time, labor, skill, and money, even under the most favorable circumstances, is represented by the raw material of this work. Had Professor Marsh done nothing beyond collecting, he would still be entitled to the lasting gratitude of all biologists.

The introduction gives a short but sufficient account of the geology of south-western Wyoming, the only region where remains of the Dinocerata have been found. The section illustrating this part is open to serious criticism, in that it substitutes for the long-established names of formations given by Hayden, King, and Powell, new terms derived from some characteristic fossil. Such arbitrary changing of accepted names can only result in 'confusion worse confounded.' This section refers the Laramie to the cretaceous, whereas it is almost certainly tertiary. The Puerco is altogether omitted.

The Dinocerata: a monograph of an extinct order of gigantic mammals. By OTHNIEL CHARLES MARSH. U. S. geological survey. Monogr. Vol. x. *Washington*, 1884. 237 p., 56 pl.

The descriptive part of the book opens with a chapter on the skull, in which the most curious part of these most curious animals is illustrated with much care. A remarkable and novel feature of this chapter is the series of sections of the skull which it presents. These sections are made in all directions, — transverse, vertical, and horizontal, — and thoroughly display the internal structure of the skull, the sinuses, cranial cavity, olfactory chambers, as well as the characters of those bones which cannot be seen from the surface. Professor Marsh has here indicated a new method of investigation, which is certain to yield valuable results in the future, as it already has in his hands. Strange to say, the description of the skull ignores almost entirely the basi-occipital, sphenoidal, and periotic regions, as well as the foramina at the base of the cranium. These are most important features, and their omission detracts materially from the value of the chapter. The lower jaw receives very thorough description and illustration: its chief peculiarities are the backward projecting condyles, and, in the males, the anterior flanges, for the protection of the great upper tusks. Professor Marsh shows that in the females these tusks were very small, and that in consequence the flanges of the mandible are absent or rudimentary; thus correcting the very natural error into which Speir and Osborn had fallen in regarding the flange as a generic instead of a sexual character.

The chapter on the teeth need not detain us except to notice the lower incisors and canines. Osborn and Speir first showed that these teeth differed from those of all other ungulates in having bilobed crowns. In his restoration of 'Tinoceras' and elsewhere, Professor Marsh represents these teeth as having a very different shape, though the only actual specimen he figures (woodcut 38, p. 37) is an evidently much-worn canine; of 'Dinoceras,' he gives figures of three isolated incisors. We must believe that the restoration of these teeth in 'Tinoceras' is erroneous.

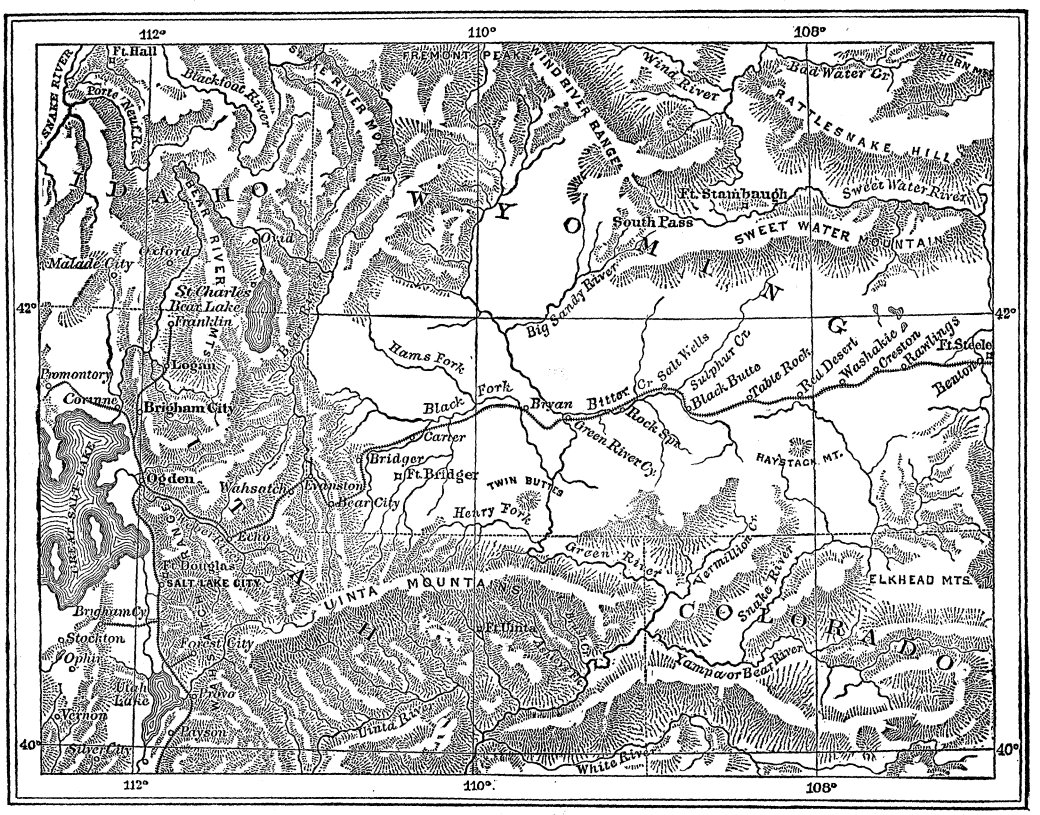
Certainly one of the most striking and valuable chapters in the book is that on the brain. The brain in the Dinocerata "was proportionately smaller than in any other known mammal, recent or fossil, and even less than in some reptiles. It was indeed the most reptilian brain in any known mammal." This is a most remarkable and unexpected fact. This chapter is enriched by an extended and valuable series of cranial casts of mammals from nearly all the tertiary formations. Lartet first pointed out the comparatively small size of the brain in the

tertiary mammals; and his results have been confirmed by Cope, Bruce, and others, but by no one with such a wealth of illustration as by Professor Marsh. The latter's generalizations, however, are somewhat vague, and not altogether novel, and in one case inaccurate. Professor Marsh says, 'All tertiary mammals had small brains.' While such is the general law, it has conspicuous exceptions; as in the lemur Anaptomorphus, described and figured by Cope, and in some miocene mammals. Of the latter Professor Marsh's selection is not the best to bring out the facts. Aside from this, Professor Marsh's assemblage of facts is of the utmost importance, and well worthy of careful study.

Chapters v.–xii. are taken up with full and accurate descriptions of the trunk, neck, and limbs. No point of importance is left in doubt, and we may be said to know the osteology of the Dinocerata almost as fully as that of any recent group of mammals. Such completeness of material, and fulness of detail, constantly excite the reader's admiration.

Chapter xiii. deals with the restoration of the Dinocerata, and will be read with great interest; and the two superb folding plates which illustrate this chapter have never been approached in the general accuracy of the separate parts, or in the beauty of drawing. In the figure of Dinoceras, however, the humerus is incorrectly drawn, and we believe that the fore-limb is too much flexed (compare plate 28, fig. 2).

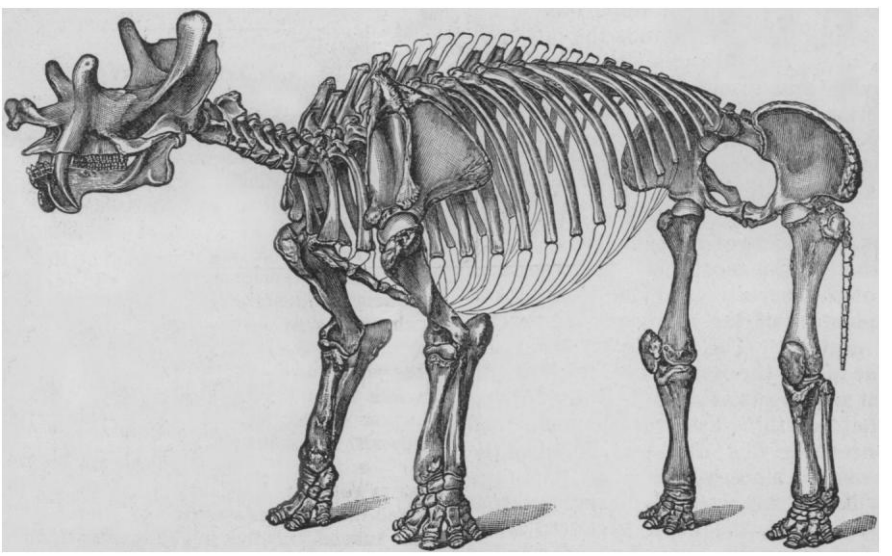
The general conclusions form the least satisfactory section of the work. Lack of space forbids any full analysis of this chapter, but some portions of it demand notice. In the main, the scheme of classification of the ungulates here proposed agrees quite closely with that made by Professor Cope (*Proc. Amer. phil. soc.*, 1882, pp. 435–447), though with some manifest improvements. No acknowledgment of this agreement is made, however, and the reader would not suppose that Cope had ever written on the subject. When the latter proposed the order Amblypoda, including Coryphodon and the Dinocerata, Professor Marsh rejected it in these words: "A careful consideration of the characters of Coryphodon, so far



as now known, indicates that the genus represents a distinct family of perissodactyl ungulates, the Coryphodontidae. The skull is clearly of this type, and the skeleton and feet present no differences sufficiently important to justify a separation from that natural order" (*Amer. journ. sc. and arts*, 3d ser. vol. xiv. p. 84). Yet in the present volume he adopts the order under the name of Amblydactyla. But the proposed new terms, Amblydactyla, Coryphodontia, Holodactyla, and Clinodactyla, are all synonymes of earlier names, and cannot be adopted. This volume is, we believe, unique among modern scientific works in not containing a single reference in the text to the work of others, and the reader never knows how much of the book has already been anticipated. There is, it is true, a scrupulously exhaustive bibliography appended; but, as few can plod through such a mass of pamphlets, injustice cannot be avoided by this method.

In conclusion, a few words as to the classification of the Dinocerata. The genus first to be named was the Uintatherium of Leidy: the Tinoceras and Dinoceras of Marsh, and the Loxolophodon and Eobasileus of Cope, were described at later dates. As far as the evidence in this volume goes, these names all refer to the same genus, which, of course, must be called Uintatherium. The shortness of this article will not allow us to attempt to prove this proposition, but we believe it capable of satisfactory demonstration. It is, however, a matter of slight importance.

The plates of this volume are beyond all praise. They are drawn with the utmost fidelity, and at the same time are most beautiful specimens of artistic skill. In this respect they may challenge comparison with any similar work. The printing and type leave nothing to be desired, and the numerous finely executed woodcuts add much to the clearness of the text. Notwithstanding, then, all that we have found to criticise, 'The Dinocerata' is a splendid piece of work, which is an honor to American scientific enterprise.



RESTORATION OF TINOCERAS INGENS MARSH. ONE-THIRTIETH NATURAL SIZE.

REPORT OF THE U. S. ENTOMOLOGIST FOR 1884.

Workers in economic entomology look forward with especial interest to the appearance of the annual report of the U. S. entomologist. The bureau under his charge is the only institution devoted to this department of science, which is liberally supported; and therefore it is rightly expected that this report shall be the most important contribution to applied entomology during the year.

The report before us, contained in the report of the department of agriculture for 1884, consists of a hundred and thirty-four pages, illustrated by ten plates. The more important articles in the body of the report treat of kerosene emulsions, the streaked cottonwood leaf-beetle, the southern buffalo gnat, and the cranberry-fruit worm. There are appended to the main report several reports by special agents.

The article of most general interest is that